

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) In a method of conducting a heterogeneous chemical reaction including the steps of forming a reactant mixture comprising one or more heterogeneous reactant(s) in a reactor, and causing said reactant(s) to react in the presence of a solid catalyst to yield a reaction mixture comprising said reactants and the reaction products of the reaction, the improvement which comprises using as said solid catalyst a macroporous solid catalyst having a surface area of from about 50-400 m²/g, and an average pore size of from about 70-150 Å, and carrying out said reaction under ~~near- or supercritical reaction conditions relative to said reactant mixture~~ conditions comprising a temperature of from about 0.9-1.3 T_c of the reactant mixture and a pressure of from about 0.9-2.5P_c of the reactant mixture.

2. (Original) The method of claim 1, said surface area being about 200 m²/g.

3. (Original) The method of claim 1, said catalyst comprising a perfluorinated polymer having sulfonic acid groups coupled thereto.

4. (Original) The method of claim 1, said chemical reaction selected from the group consisting of alkylation, acylation, isomerization, aromatic disproportionation, alcohol synthesis and Fischer-Tropsch reactions.

5-9 (Canceled)

10. (Currently Amended) The method of claim [9] 1, said temperature being from about 1.01-1.2 T_c of the reactant mixture.

11. (Cancelled)

12. (Currently Amended) The method of claim [11] 1, said reaction being carried out at a pressure of from about 1.01-1.2 P_c of the reactant mixture.

13. (Original) The method of claim 1, said reactant mixture being formed by continuously introducing said reactant(s) into said reactor including a co-solvent or diluent under substantially steady state reactor conditions, said catalyst being susceptible to deactivation owing to coke laydown during the course of said reaction, said method including the step of regenerating said catalyst by terminating said introduction of at least one of said reactant(s) prior to a time when said solid catalyst is significantly deactivated owing to coke laydown, elevating the pressure and/or lowering the temperature within said reactor to remove at least a portion of any coke on the catalyst, resuming introduction of said reactant(s) into said reactor and reestablishing said substantially steady state conditions.

14. (Original) The method of claim 13, the pressure within said reactor being elevated by at least about 40%, as compared with the pressure within the reactor during said chemical reaction.

15. (Original) The method of claim 13, the reactor temperature being lowered while still maintaining the reactor temperature above the T_c of the co-solvent or diluent.

16. (Currently Amended) A method of conducting a heterogeneous chemical reaction comprising the steps of:

introducing one or more heterogeneous reactant(s) and a co-solvent or diluent into a reactor to form a reactant mixture comprising said reactants and the reaction products of the reaction, and causing said reactant(s) to react therein to yield a reaction mixture in the presence of a solid catalyst susceptible to deactivation owing to coke laydown during the course of said reaction,

said reaction being carried out under substantially steady state near- or supercritical reaction conditions for the reactant mixture, said near- or supercritical reaction conditions comprising a temperature of from about 0.9-1.3 T_c of the reactant mixture and a pressure of from about 0.9-2.5 P_c of the reactant mixture;

regenerating said catalyst of coke during the course of said reaction, including the steps of interrupting said chemical reaction by terminating said introduction of at least one of said reactant(s) into said reactor prior to a time when the catalyst is significantly deactivated, and regenerating said catalyst by elevating the pressure

within said reactor and/or lowering the reactor temperature to effect at least partial removal of coke from said catalyst; and
resuming said chemical reaction by again introducing said reactant(s) into the reactor, and reestablishing said substantially steady state conditions.

17. (Original) The method of claim 16, said regenerating step being carried out before the rate of production of a desired reaction product falls by a factor of 20%, as compared with the steady state reaction product production rate prior to the regenerating step.

18. (Original) The method of claim 16, said solid catalyst having a surface area of from about 50-400 m²/g.

19. (Original) The method of claim 16, said catalyst comprising a perfluorinated polymer having sulfonic acid groups coupled thereto.

20. (Original) The method of claim 16, said chemical reaction selected from the group consisting of alkylation, acylation, isomerization, aromatic disproportionation, alcohol synthesis and Fischer-Tropsch reactions.

21-25. (Canceled)

26. (Currently Amended) The method of claim [25] 16, said temperature being from about 1.01-1.2 T_c of the reactant mixture.

27. (Cancelled)

28. (Currently Amended) The method of claim [27] 16, said reaction being carried out at a pressure of from about 1.01-1.2 P_c of the reactant mixture.

29. (Original) The method of claim 16, the pressure within said reactor during said regenerating step being elevated by at least about 40%, as compared with the pressure within the reactor during said chemical reaction.

30. (Original) The method of claim 16, the reactor temperature being lowered while still maintaining the reactor temperature above the T_c of the co-solvent or diluent.

31. (Original) The method of claim 16, including the step of recovering said removed coke.

32-47. (Canceled)

48. (Currently Amended) A method of conducting a heterogeneous chemical reaction comprising the steps of:

introducing one or more heterogeneous reactant(s) and a co-solvent or diluent into a reactor to form a reactant mixture, and causing said reactant(s) to react therein to yield a reaction mixture in the presence of a solid catalyst susceptible to deactivation owing to coke laydown during the course of said reaction, said reaction being carried out under substantially steady state near- or supercritical reaction conditions for the reactant mixture, said near- or supercritical reaction conditions comprising a temperature of from about 0.9-1.3 T_c of the reactant mixture and a pressure of from about 0.9-2.5 P_c of the reactant mixture; regenerating said catalyst of coke during the course of said reaction, including the steps of interrupting said chemical reaction by terminating said introduction of at least one of said reactant(s) into said reactor prior to a time when the catalyst is significantly deactivated, and regenerating said catalyst by lowering the reactor temperature to effect at least partial removal of coke from said catalyst; and resuming said chemical reaction by again introducing said reactant(s) into the reactor, and reestablishing said substantially steady state conditions.

49. (Currently Amended) A method of conducting a heterogeneous alkylation reaction, said reaction including isoparaffin, an olefin, and a molar excess of an inert co-solvent or diluent as reactants, said method comprising the steps of:

introducing one or more heterogeneous reactant(s) and a co-solvent or diluent into a reactor to form a reactant mixture, and causing said reactant(s) to react therein to

yield a reaction mixture in the presence of a solid catalyst susceptible to deactivation owing to coke laydown during the course of said reaction, said reaction being carried out under substantially steady state near- or supercritical reaction conditions for the reactant mixture, said near- or supercritical reaction conditions comprising a temperature of from about 0.9-1.3 T_c of the reactant mixture and a pressure of from about 0.9-2.5 P_c of the reactant mixture; regenerating said catalyst of coke during the course of said reaction, including the steps of interrupting said chemical reaction by terminating said introduction of at least one of said reactant(s) into said reactor prior to a time when the catalyst is significantly deactivated, and regenerating said catalyst by elevating the pressure within said reactor and/or lowering the reactor temperature to effect at least partial removal of coke from said catalyst; and resuming said chemical reaction by again introducing said reactant(s) into the reactor, and reestablishing said substantially steady state conditions.

50. (Currently Amended) A method of conducting a heterogeneous chemical reaction comprising the steps of:

introducing one or more heterogeneous reactant(s) and a co-solvent or diluent into a reactor to form a reactant mixture, and causing said reactant(s) to react therein to yield a reaction mixture in the presence of a solid catalyst susceptible to deactivation owing to coke laydown during the course of said reaction,

said reaction being carried out under substantially steady state near- or supercritical reaction conditions for the reactant mixture, said near- or supercritical reaction conditions comprising a temperature of from about 0.9-1.3 T_c of the reactant mixture and a pressure of from about 0.9-2.5 P_c of the reactant mixture;

regenerating said catalyst of coke during the course of said reaction, including the steps of interrupting said chemical reaction by terminating said introduction of at least one of said reactant(s) into said reactor prior to a time when the catalyst is significantly deactivated, and regenerating said catalyst by increasing the density of said reaction mixture to effect at least partial removal of coke from said catalyst; and

resuming said chemical reaction by again introducing said reactant(s) into the reactor, and reestablishing said substantially steady state conditions.

51. (New) In a method of conducting a heterogeneous chemical reaction including the steps of forming a feed mixture comprising one or more heterogeneous reactant(s) in a reactor, and causing said reactant(s) to react in the presence of a solid catalyst to yield a reaction mixture comprising said reactants and the reaction products of the reaction, the improvement which comprises using as said solid catalyst a macroporous solid catalyst having a surface area of from about 50-400 m²/g, and an average pore size of from about 70-150 Å, and carrying out said reaction under conditions comprising a temperature of from about 0.9-1.3 T_c of the feed mixture and a pressure of from about 0.9-2.5 P_c of the feed mixture.

52. (New) In a method of conducting a heterogeneous alkylation reaction including the steps of forming a reactant mixture comprising one or more heterogeneous reactant(s) in a reactor, and causing said reactant(s) to react in the presence of a solid catalyst to yield a reaction mixture comprising said reactants and the reaction products of the reaction, the improvement which comprises using as said solid catalyst a macroporous solid catalyst having a surface area of from about 50-400 m²/g, and an average pore size of from about 70-150 Å, and carrying out said reaction under conditions comprising a temperature of from about 0.9-1.3 T_c of the reactant mixture and a pressure of from about 0.9-2.5P_c of the reactant mixture.